

What is Claimed is:

1. An optical disk device comprising:

a frame;

an optical pick-up module, fixed to the frame; and

a circuit board, forming a control circuit fixed to the frame;

wherein the frame is provided with fixing parts to other members.

2. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame has a form capable of being screwed.

3. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame has a form capable of being ultrasonic welded or thermally welded.

4. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame has a form capable of being fixed by an adhesive agent and at least a part of the fixing parts can be fixed by the adhesive agent or can be fixed by using an adhesive material and other connecting means

to the other members.

5. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame has a form capable of being engaged between the fixing part and the corresponding fixing part of other members.

6. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame is provided integrally with the frame.

7. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame is composed of another member made of the same material as that of the frame or a different material from that of the frame and attached to a prescribed position of the frame.

8. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame has a substantially planar part and the substantially planar part of the fixing part is substantially parallel to the surface of the frame.

9. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame has a substantially planar part and the substantially planar part of the fixing part is substantially perpendicular to the surface of the frame.

10. The optical disk device according to claim 1, wherein at least a part of the fixing parts to other members provided in the frame is provided in the outer peripheral part of the frame.

11. The optical disk device according to claim 1, wherein the fixing parts to other members provided in the frame, are disposed at two to ten positions.

12. The optical disk device according to claim 1, wherein the weight of the frame is 15g or lower.

13. The optical disk device according to claim 1, wherein the weight of the optical disk device is 135 g or lower.

14. The optical disk device according to claim 1, wherein a through hole is provided in the frame and the optical pick-up module is attached to the back surface

of the frame so that at least a part of the optical pick-up module is exposed from the through hole.

15. The optical disk device according to claim 1, wherein the optical pick-up module comprises:

- a module frame;

- a pair of shafts, provided in the module frame;

- a carriage, provided on the pair of shafts so as to be movable and having optical members mounted thereon,

- a driving unit, provided in the module frame to drive the carriage,

- a cover, attached to the module frame, and having a through hole and exposing at least a part of the carriage from the through hole; and

- a spindle motor, attached to the module frame;

- wherein the module frame is fixed to the frame through a vibration preventing material.

16. The optical disk device according to claim 1, wherein:

- the frame has an uplift part rising to a surface side on which a disk is mounted; and

- the uplift part includes side parts of the frame and a top part provided on the side parts, the side parts are formed to be thicker in the direction of thickness

than other side part near the side parts and the top part forms a part of the inner peripheral part of a through hole provided in the frame.

17. The optical disk device according to claim 1, wherein a lead-free material is used for members forming the optical pick-up module or the connecting materials of the members, electronic parts forming the circuit board or the connecting materials of the electronic parts and other members mounted on the frame or the connecting materials of the members.

18. The optical disk device according to claim 1, wherein the frame is made of a material including a resin and the weight of the frame is 13g or lower.

19. The optical disk device according to claim 18, wherein a resin material is an electric conductive resin material.

20. The optical disk device according to claim 18, wherein the frame is formed by laminating a plurality of members in the direction of thickness.

21. The optical disk device according to claim 18,

wherein the frame is formed by arranging a plurality of members made of different materials in a planar form and connecting them.

22. The optical disk device according to claim 18, wherein the frame is formed by arranging a plurality of members made of the same material in a planar form and connecting them:

23. The optical disk device according to claim 18, wherein the frame is formed by sandwiching a metal plate or a ceramic plate in between a pair of plate type resin plates.

24. The optical disk device according to claim 18, wherein the frame is formed by dispersing plate type pieces, linear metal, ceramic materials, etc. in a resin.

25. The optical disk device according to claim 18, wherein an uplift part is provided outside the maximum diameter of a disk on the surface of the frame on which the disk is mounted to reinforce the frame.

26. The optical disk device according to claim 18, wherein a recessed part for taking out the disk is provided

on the surface of the frame on which the disk is mounted.

27. The optical disk device according to claim 18, wherein the cover of the optical pick-up module disposed on substantially the same surface as the surface of the frame on which the disk is mounted forms an uplift part within a range substantially opposed to a moving range of the carriage in the optical pick-up module.

28. The optical disk device according to claim 1, wherein a plurality of circuit boards are provided and the plurality of circuit boards are separated from each other and fixed to the frame.

29. The optical disk device according to claim 28, wherein an engaging unit for engaging the frame with the circuit boards is provided.

30. The optical disk device according to claim 28, wherein hook parts are provided in the frame and engaging parts engaging with the hook parts are provided in the circuit boards.

31. The optical disk device according to claim 28, wherein the plurality of circuit boards include a first

circuit board for controlling at least the optical pick-up module and a second circuit board for controlling at least one of recording and reproduction.

32. The optical disk device according to claim 28, wherein the plurality of circuit boards are attached to a back surface opposite to the side of the frame on which the optical disk is mounted.

33. The optical disk device according to claim 28, wherein a through hole is provided in the frame and the optical pick-up module is attached to the back surface of the frame so that at least a part of the optical pick-up module is exposed from the through hole.

34. The optical disk device according to claim 33, wherein the plurality of circuit boards are respectively provided in both the sides of the frame with respect to a straight line for connecting the spindle motor to an objective lens as a boundary.

35. The optical disk device according to claim 28, wherein the plurality of circuit boards are connected together by a flat plate type connecting member and the flat plate type connecting member is folded at least once.



36. The optical disk device according to claim 35, wherein the flat plate type connecting member is folded even number of times.

37. The optical disk device according to claim 35, wherein the folded part of the flat plate type connecting member is provided in the vicinity of a vertical bisector of the long side of a connecting part of a connector for connecting the connecting member.

38. The optical pick-up device according to claim 35, wherein the plurality of circuit boards respectively have connectors and the connecting member is detachably attached to the connectors.

39. The optical disk device according to claim 35, wherein the optical pick-up module is sandwiched in between the frame and the cover fixed to the frame and the connecting member is provided in an opposite side to the side of the cover in which the optical pick-up module is provided.

40. The optical disk device according to claim 39, wherein a resin sheet is provided in at least a part of the opposed part of the connecting member to the cover.

41. The optical disk device according to claim 39, wherein a fixing member for fixing the connecting member to the cover is provided.

42. The optical disk device according to claim 41, wherein a double side tape is used as the fixing member.

43. The optical disk device according to claim 41, wherein an adhesive member is used as the fixing member and the connecting member is fixed to the cover by the adhesive member.

44. The optical disk device according to claim 41, wherein a flexible member is used as the fixing member and the flexible member is connected to the cover with a space provided and the connecting member passes between the connecting parts of the flexible member to be detachably fixed.

45. The optical disk device according to claim 35, wherein as the flat plate type connecting member, a flat cable or a flexible board is used.

46. The optical disk device according to claim 1, wherein a control switch directly or indirectly fixed

to the frame is provided.

47. The optical disk device according to claim 46, wherein the control switch is provided on the circuit board.

48. The optical disk device according to claim 46, wherein the control switch transmits a control signal of a mounted electronic device.

49. The optical disk device according to claim 46, wherein the control switch is attached so as to move along the direction of thickness of the frame.

50. The optical disk device according to claim 46, wherein a plurality of moving members of the control switch are provided.

51. The optical disk device according to claim 1, wherein a brake member abutting on the outer periphery of a disk fixed and mounted on the frame is separately provided and the brake member is disposed so as to abut on/ not abut on the outer periphery of the disk.

52. The optical disk device according to claim 51,

wherein the brake member comprises:

a contact piece, movably provided;

an urging unit, resiliently pressing the contact piece; and

at least one case, housing the respective parts.

53. The optical disk device according to claim 52, wherein the case is formed integrally with the frame and protrudes on the surface of the frame on which the disk is mounted.

54. The optical disk device according to claim 53, wherein the case comprises:

side walls, formed integrally with the frame and protruding on the surface side of the frame and surrounding at least three parts; and

a top plate, formed integrally with the side walls and covering an upper part and is opened in the optical pick-up module side;

and wherein the contact piece is provided so as to close the opening and held to be movable so that the contact piece comes near to or separates from the optical pick-up module.

55. The optical disk device according to claim 51,

wherein the brake member is moved due to the action of an external member.

56. The optical disk device according to claim 55, wherein as the external member, a member provided in the electronic device or the like and interlocking with an operation for taking out the disk and the interlocking

member acts on the brake member.